



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/561,048

12/14/2005

Shinji Nishimae

60004-109US1

3964

69713

7590

06/06/2008

OCCHIUTI ROHLICEK & TSAO, LLP
10 FAWCETT STREET
CAMBRIDGE, MA 02138

EXAMINER

LISTVOYB, GREGORY

ART UNIT

PAPER NUMBER

1796

NOTIFICATION DATE

DELIVERY MODE

06/06/2008

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

INFO@ORTPATENT.COM

Office Action Summary	Application No. 10/561,048	Applicant(s) NISHIMAE ET AL.	
	Examiner GREGORY LISTVOYB	Art Unit 1796	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 March 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

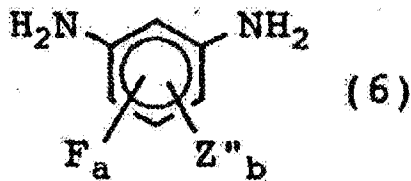
Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-12 rejected under 35 U.S.C. 103(a) as being unpatentable over Masayoshi et al (EP 1275679, enclosed with Application examined) herein Masayoshi in combination with Hazen et al (US 5011997) herein Hazen and Andrews et al ("Proton magnetic resonance spectra of some 2-substituted 1,3 phenylenediamines and their N, N'diacyl derivatives, Aust.J. Chem, 1971, pp.413-422, enclosed with Application examined) herein Andrews (All references cited in the previous office Action, necessitated by Amendment).

Masayoshi discloses a fluorinated phenylenediamine of the following formula (6) (see page 11, line 031):



where Z" denotes a chlorine, bromine, or iodine atom, preferably a chlorine atom or a bromine atom, and most preferably a chlorine atom, a denotes the number of fluorine atoms bonded to a benzene ring, representing an integer of 0 - 4, preferably 0, 3, or 4, and b denotes the number of "Z" "bonded to a benzene ring, representing 0 - 4, preferably 0, 1, or 4. In the preceding formula, when "Z"" is present plurally (namely, b denotes an integer of 2 - 4) in a benzene ring, each Z' may be same or different. In the foregoing formula, the total of a and b ought to be invariably 4 (namely, $a + b = 4$).

The above formula (6) is identical to one of Claim 1 of the Application examined and used for the same purposes of polyimide synthesis.

Regarding Claims 2 and 7, Masayoshi teaches 1,3-diamino-2,4,5,6-tetrafluorobenzene, and 5-chloro-1,3-diamino-2,4,6-trifluorobenzene (see page 11, line 031), which are identical to diamine of the above Claim.

In reference to Claims 5-7, 11, 12 Masayoshi teaches a method of making of a polyamic acid and a polyimide based on the above diamine, where tetracarboxylic acid dianhydride is based on variety of divalent organic radicals (see page 12, line 033) at the presence of organic solvent (see page 12, line 35).

Masayoshi does not teach a method for the production of a fluorinated aromatic diamine from corresponding diamide.

Hazen discloses a method for the production of a fluorinated aromatic diamine (see Column 2, line 45) which comprises steps of reacting a diamide with NaOCl (Sodium Hypochlorite, see Column 3, line 10) at a molar ratio of the NaOCl to the diamide (NaOX/diamide ratio) in the range of 2.1 -2.2 (see Column 4, line 25).

Note that in Hazen process a molar ratio of the NaOH to the diamide (NaOH/diamide ratio) is higher than 6. This is an Examiner's position that NaOH role in Hoffmann rearrangement process (the same method used by both Hazen and the Application examined) is to create certain pH. Since Hazen's diamine has much higher molecular weight compare to one in the application, the molar ratio of the NaOH to the diamide (NaOH/diamide ratio) is higher than 6.0 at the same pH range.

Andrews discloses preparation of Isophthalic-based diamine from corresponding diamines with Hoffmann rearrangement. He teaches that the NaOH to the diamide (NaOH/diamide ratio) is 2.25 (see page 416), which is within the claimed range.

Therefore, it would have been obvious to a person of ordinary skills in the art to use such a NaOH/diamide ratio, which provides an effective Hoffmann rearrangement process.

Hazen discloses the NaOX/diamide ratio is 2.2-2.3 (see Column 4, line 25), which does not meet the newly added limitation that NaOX/diamide ratio is within the range of 3-6.

However, he teaches that “higher excesses of the hypohalite are effective to convert the diamide to diamine but that will increase the amount of azo compound formation, which increases the severity of the reaction conditions in the second step of the process the reduction step. Lower amounts of the hypohalite, of course, requires more severe reaction conditions in the initial step of the Hofman Reaction, or results in incomplete reaction. It will be apparent to the skilled worker in the field to determine the effective amount of hypohalite that person wishes to employ in the Hofmann Reaction to convert the diamide to diamine; e.g. any amount may be used from theoretical to a large excess. (see Column 4, line 25).”

Therefore, it would have been obvious to a person of ordinary skills in the art to determine the effective amount of hypohalite that person wishes to employ in the Hofmann Reaction to convert the diamide to diamine; e.g. any amount may be used from theoretical to a large excess in order to achieve a balance between purity of the product, its yield and severity of reaction conditions.

In addition, note that Hazen discloses a process for by-product removal, which yielded high purity product (see Column 3, line 40).

Hazen teaches that the above Hoffmann rearrangement process results in a ' product of high purity (more than 95%) and high yield (see Column 5, line 15), which is much higher compare to ones of traditional methods (yield is within the range of 26-42%, see Column 1, line 20). It makes this process very attractive for production of raw materials for polyimides.

Therefore, it would have been obvious to a person of ordinary skills in the art to use Hoffmann rearrangement method disclosed by Hazen and Andrews for production of high purity diamines. It makes the process of the following manufacture of polyimides more economical and resulting polymers with better properties.

Regarding Claims 4 and 8-10, fluorinated phenylenediamines which are produced with Hazen or Andrews's method would be expected to have molar absorbtion coefficient at 450 nm of not more than 2.51/mol cm, due to their high purity.

Response to Arguments

Applicant's arguments filed on 2/13/2008 have been fully considered but they are not persuasive.

The Applicant argues that n view of the teachings in Hazen, the artisan would have been motivated to decrease, rather than increase, the NaOX/diamide ratio as

Art Unit: 1796

increasing this ratio would result in higher amounts of azo by-product thereby rendering the purification more difficult.

The Examiner disagrees. Hazen teaches that “higher excesses of the hypohalite are effective to convert the diamide to diamine but that will increase the amount of azo compound formation, which increases the severity of the reaction conditions in the second step of the process the reduction step. Lower amounts of the hypohalite, of course, requires more severe reaction conditions in the initial step of the Hofman Reaction, or results in incomplete reaction. **It will be apparent to the skilled worker in the field to determine the effective amount of hypohalite that person wishes to employ in the Hofmann Reaction to convert the diamide to diamine; e.g. any amount may be used from theoretical to a large excess. (see Column 4, line 25).**”

Thus, Hazen established the trend yield/purity as a function of NaOX/diamide ratio and discloses the method of purification. Having this knowledge, a person of ordinary skills can set up a process for a particular application, changing the above technological parameters.

The Applicant argues that compare to Hazen, Applicant's process produces more pure product with higher yield, based on Example 2 of the Specification. However, the above methods are not comparable, since Hazen teaches a process for bis (4-aminophenyl)hexafluoropropane, whereas in Example 2, the Applicant produces tetrafluoroisophthalamide.

The Examiner agrees with Applicant's calculation of Andrews data, where NaOX/diamide ratio is equal to 2. However, as it was stated above, depending on diamide structure and specific requirements to a product and process, a person of ordinary skills can set up a process for a particular application, changing the above technological parameters.

The Examiner appreciates corrections made by the Applicant in Examiner's calculations.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to GREGORY LISTVOYB whose telephone number is (571)272-6105. The examiner can normally be reached on 10am-7pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vasu Jagannathan can be reached on 571-272-1119. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Rabon Sergent/
Primary Examiner, Art Unit 1796

GL

Application/Control Number: 10/561,048
Art Unit: 1796

Page 10